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None

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G4A
Selected US specifications from IPC sub-class G06F

(54) Method of editing individual television programs and apparatus therefore

(57) Apparatus for editing a table of television programs for provides a list in units of time intervals and TV channel numbers for each of a plurality of subscribers. Each subscriber indicates his preferred material for viewing by means of a completed questionnaire. Programme makers indicate the nature of the program contents by means of a completed program evaluation questionnaire. Objective data are derived statistically by linear programming of the questionnaires. The processed results are input to a computer and are preferably stored on a hard disk. The storage contents are read out from the hard disk and are printed out. Subscriber complaints about the program list are fed back periodically to improve prediction precision. An automatic controller attuned to subscriber taste results when the individual subscriber program list is used to control automatically a TV or video tape recorder.

FIG.2

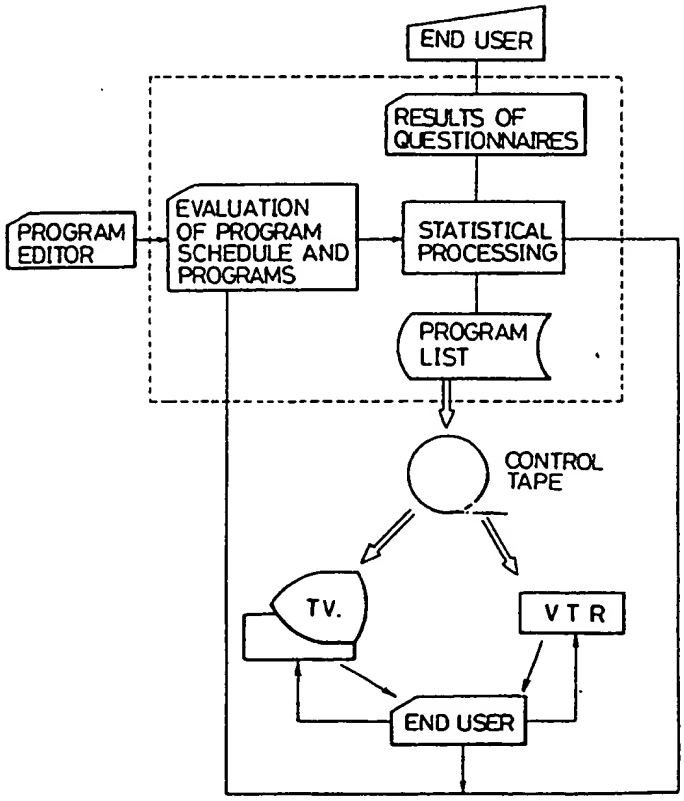

FIG. 1

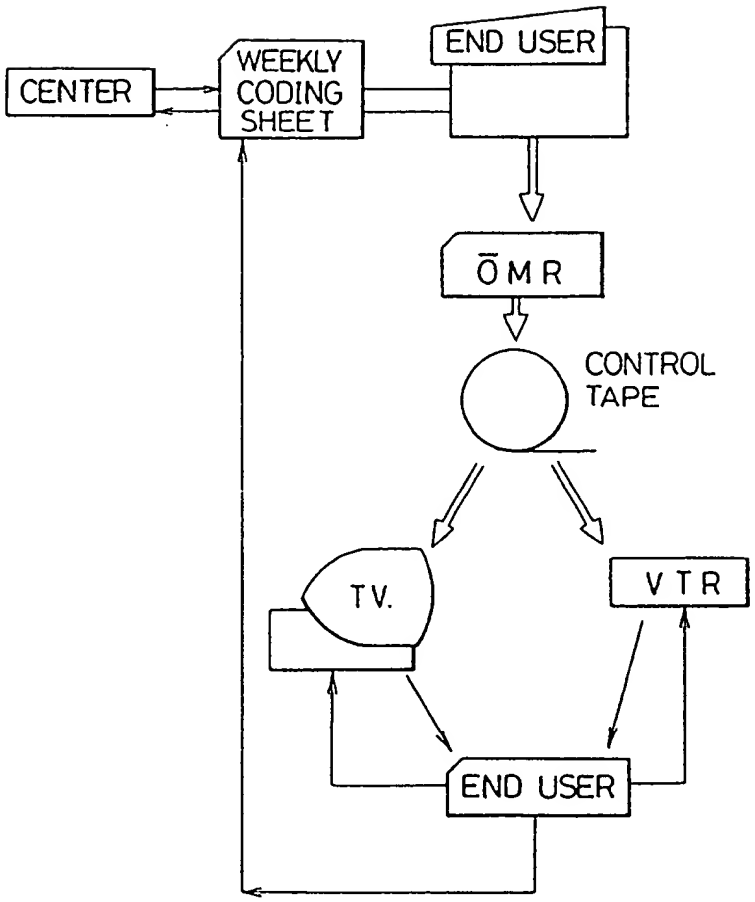
CENTER
WEEKLY CODING SHEET
END USER
ŌMR
CONTROL TAPE
TV.
VTR
END USER

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FIG.2

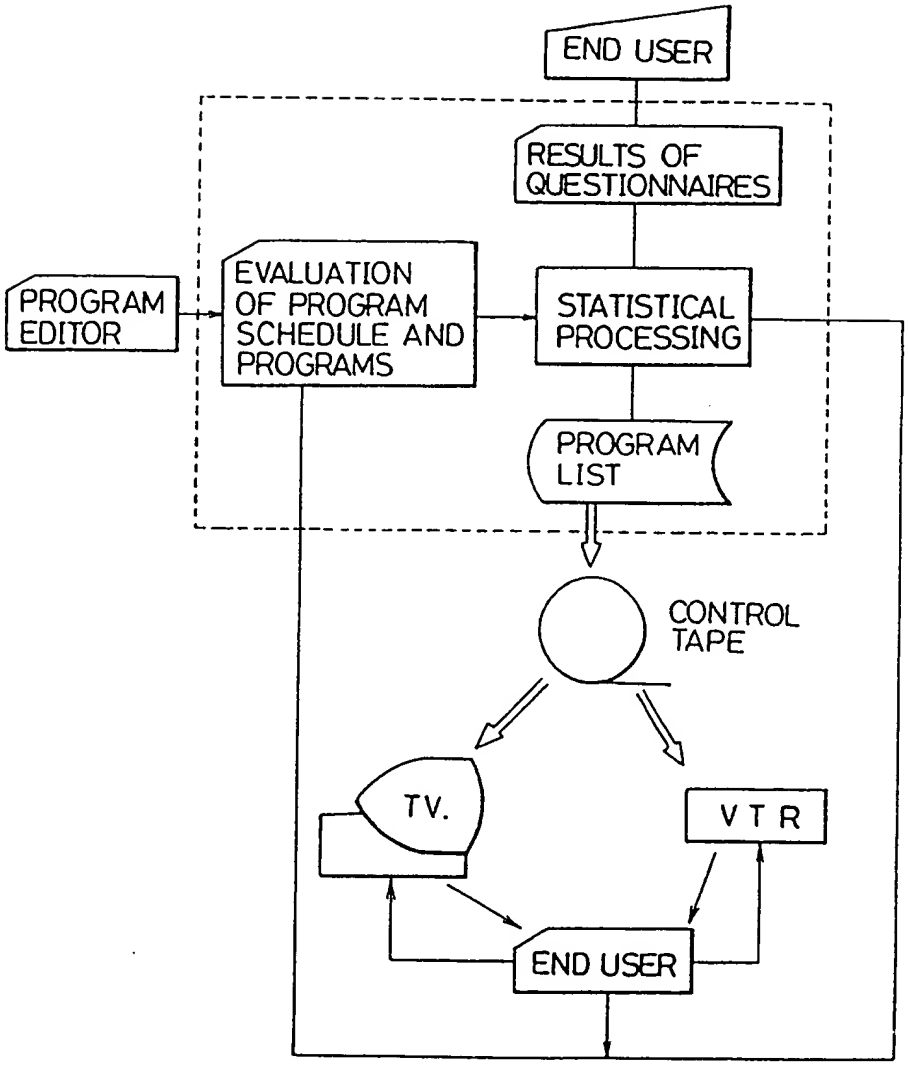

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FIG. 3

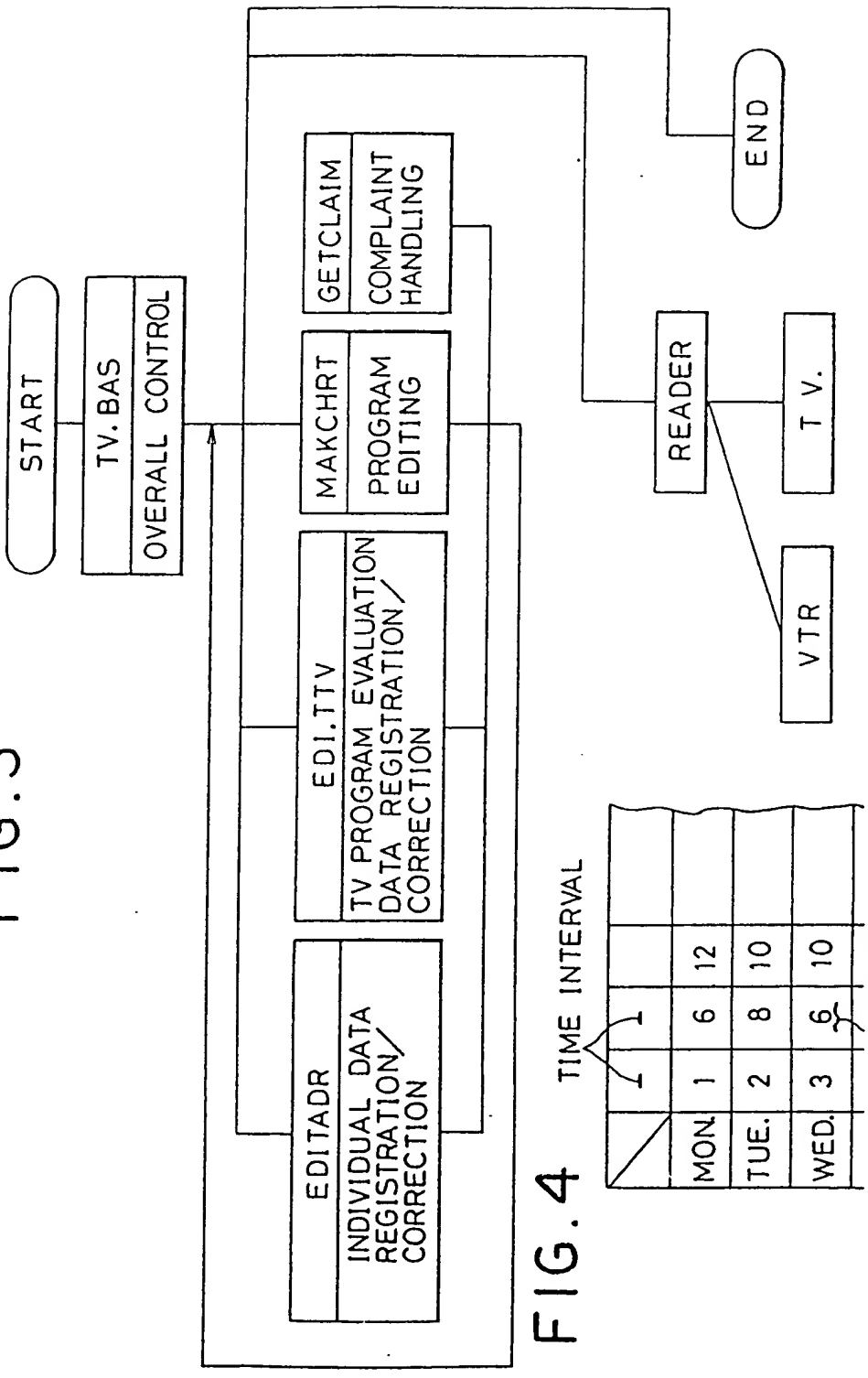

FIG. 4

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FIG.5

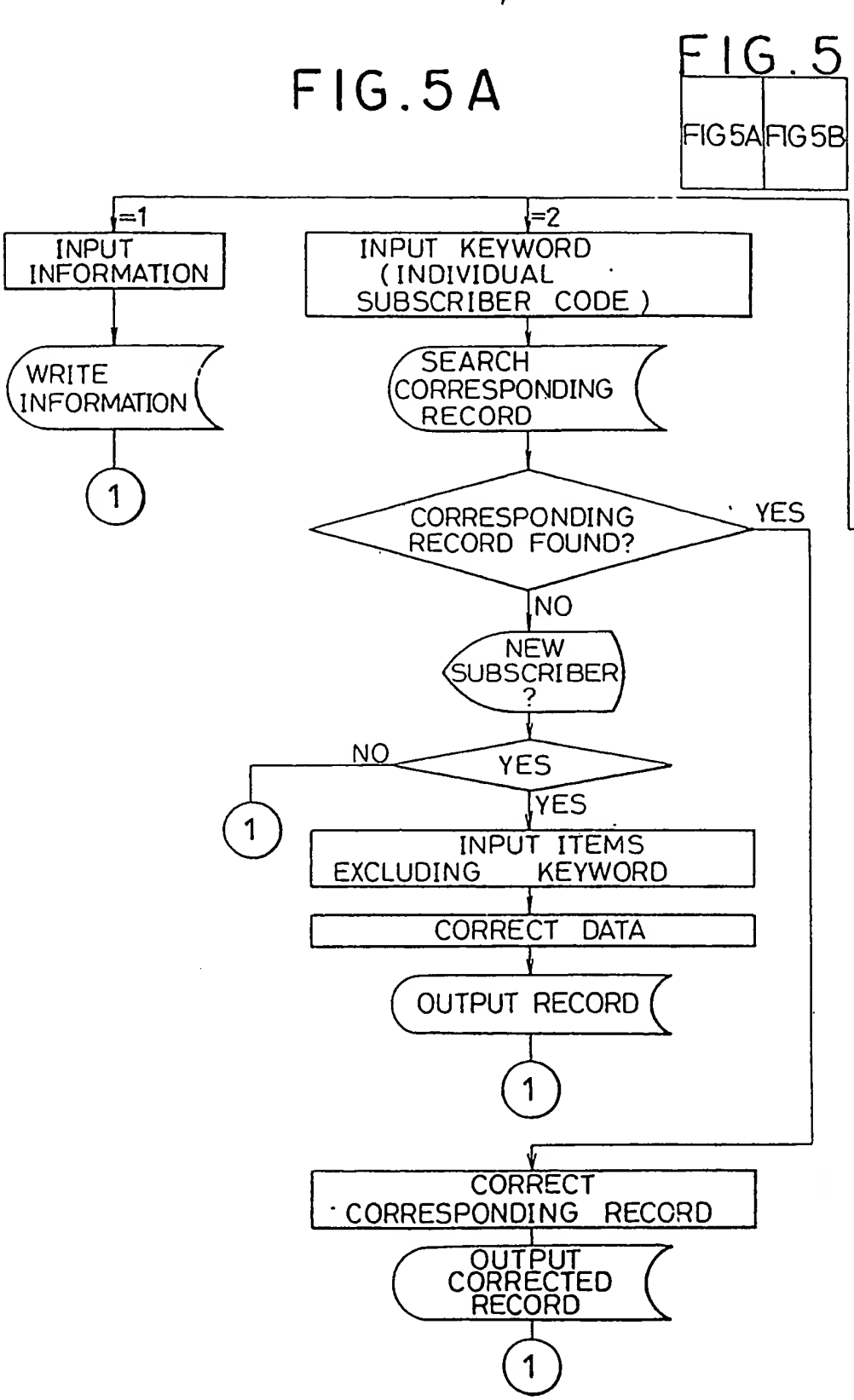

FIG.5A

FIG.5B

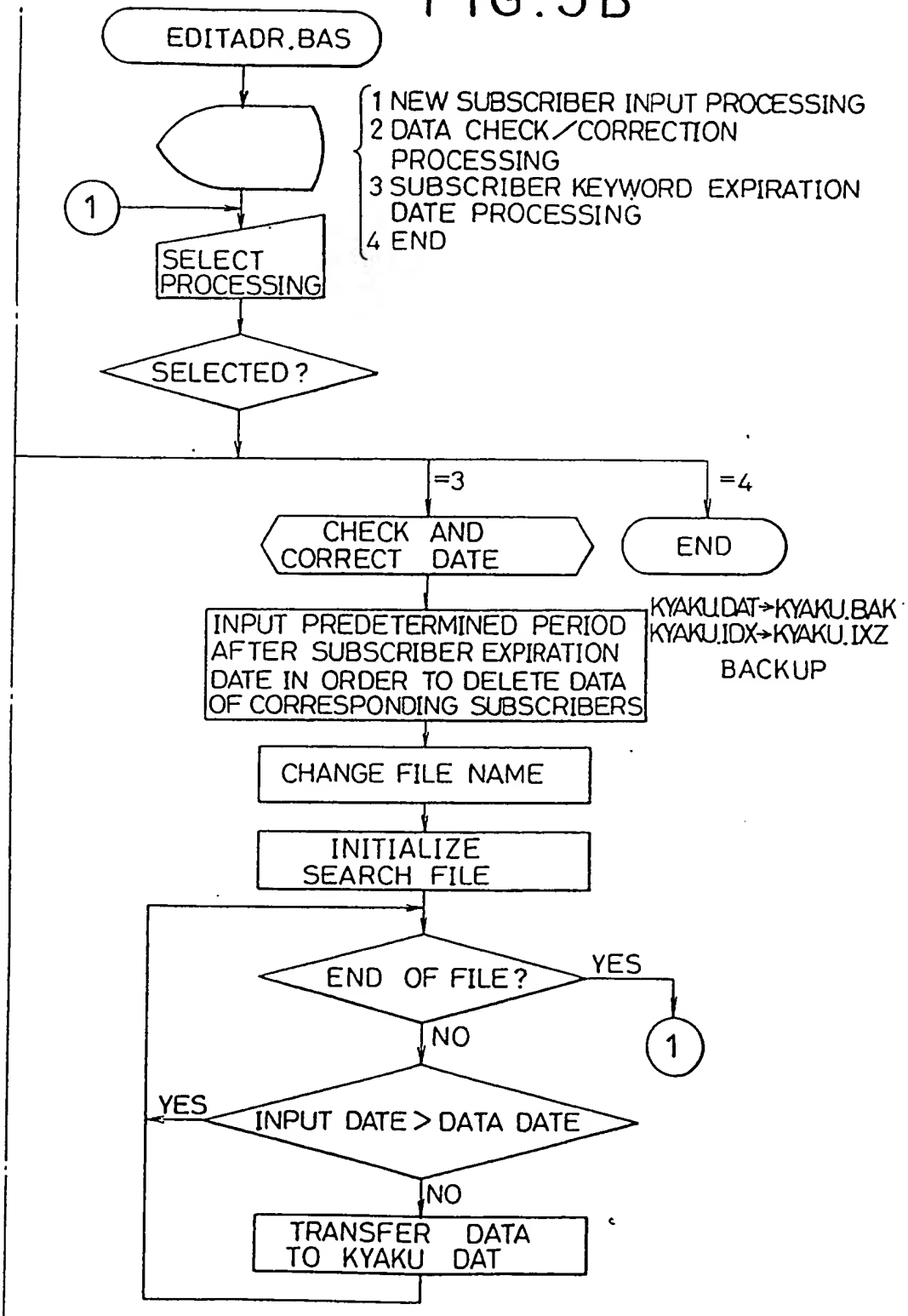
EDITADR.BAS
1 NEW SUBSCRIBER INPUT PROCESSING
2 DATA CHECK/CORRECTION PROCESSING
3 SUBSCRIBER KEYWORD EXPIRATION DATE PROCESSING
4 END
1
SELECT PROCESSING
SELECTED?
=3
=4
CHECK AND CORRECT DATE
END
INPUT PREDETERMINED PERIOD AFTER SUBSCRIBER EXPIRATION DATE IN ORDER TO DELETE DATA OF CORRESPONDING SUBSCRIBERS
KYAKU.DAT→KYAKU.BAK
KYAKU.IDX→KYAKU.IXZ
BACKUP
CHANGE FILE NAME
INITIALIZE SEARCH FILE
END OF FILE?
YES
NO
1
YES
INPUT DATE > DATA DATE
NO
TRANSFER DATA TO KYAKU DAT

FIG.6B

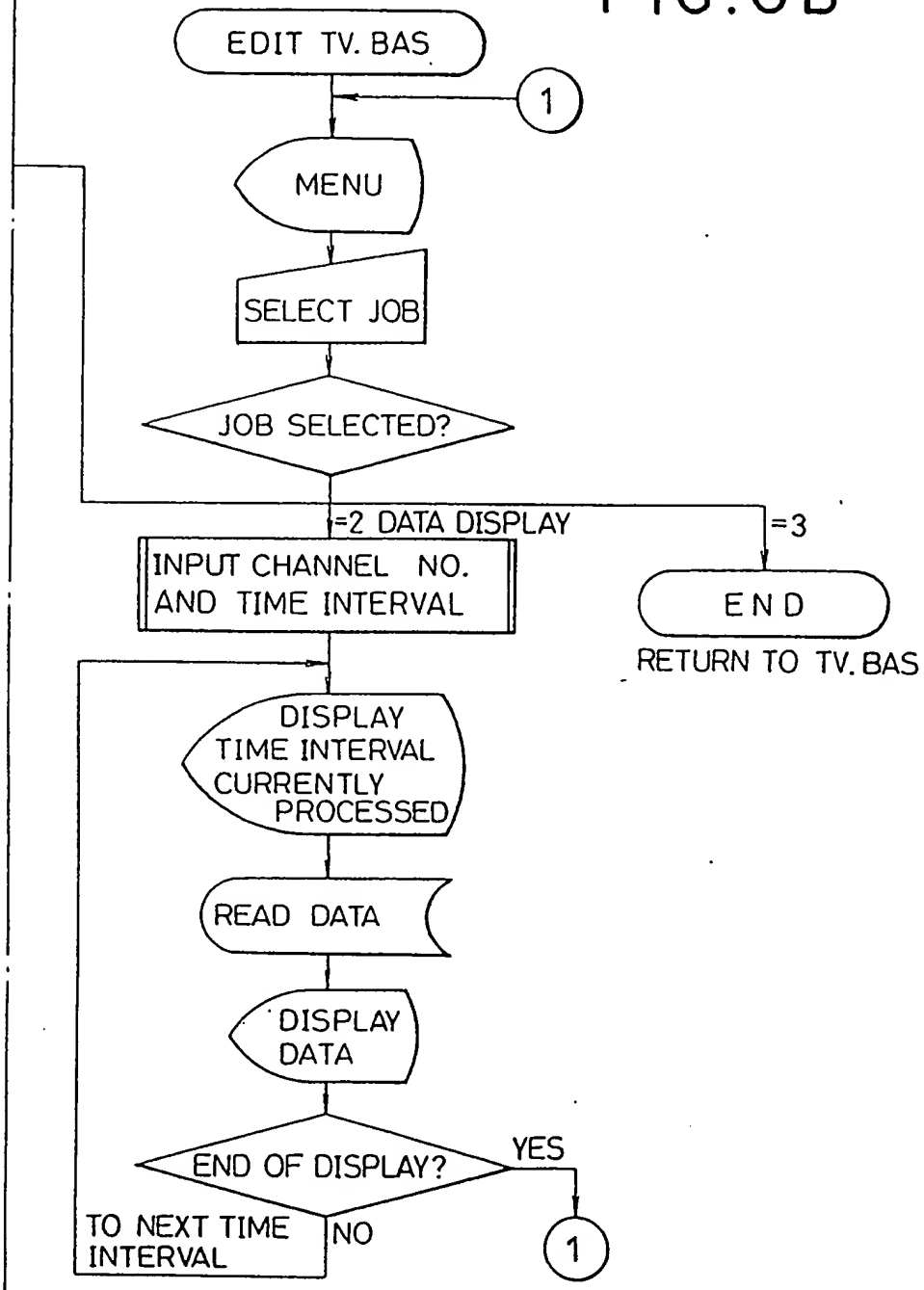
EDIT TV. BAS
1
MENU
SELECT JOB
JOB SELECTED?
=2 DATA DISPLAY
=3
INPUT CHANNEL NO.
AND TIME INTERVAL
END
RETURN TO TV. BAS
DISPLAY
TIME INTERVAL
CURRENTLY
PROCESSED
READ DATA
DISPLAY
DATA
END OF DISPLAY?
YES
TO NEXT TIME
INTERVAL
NO
1

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FIG. 7

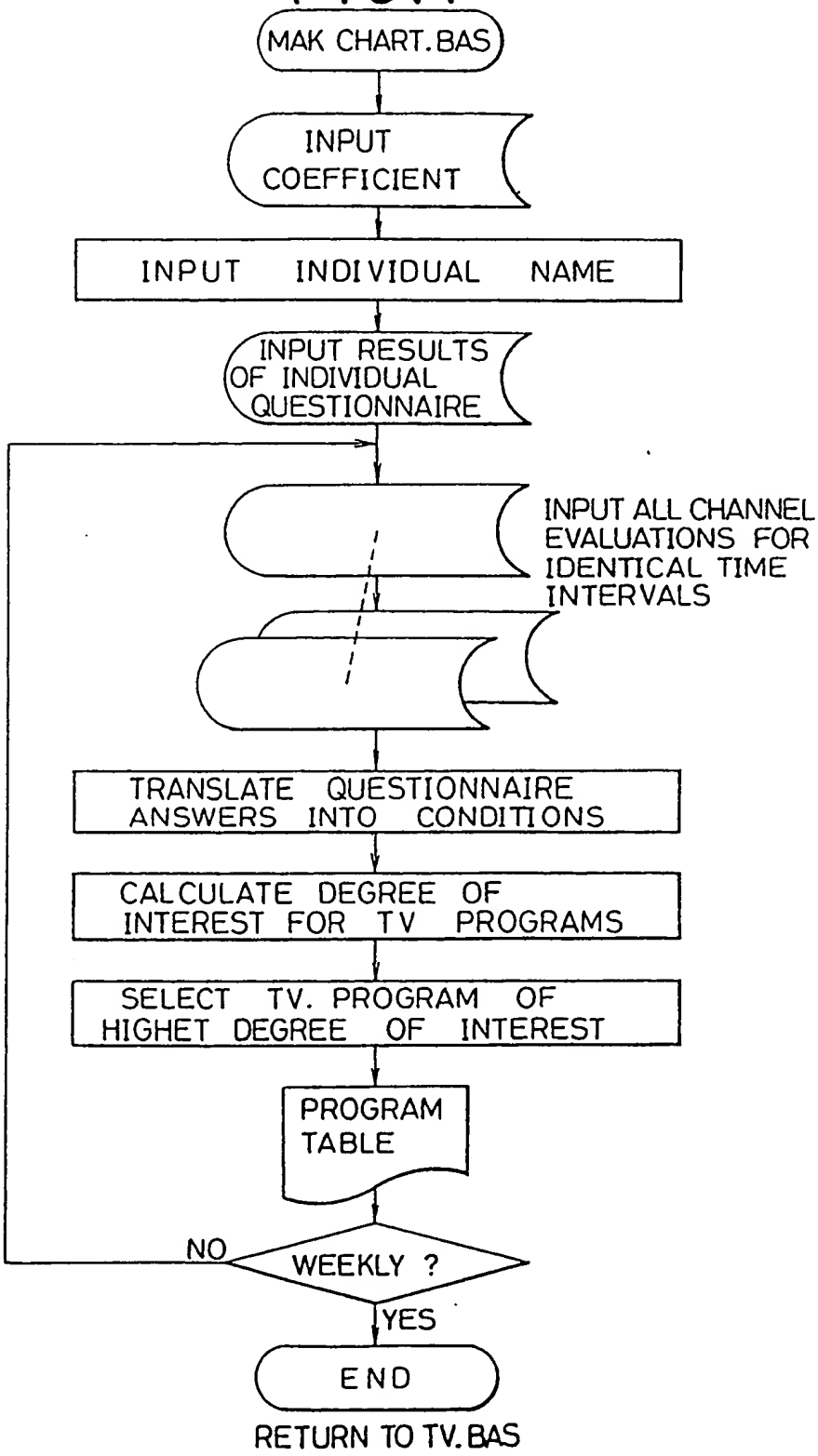

FIG.8

MORNING	5				6				7				8				9				10				11			
	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45
	-	-	1	1	1	1	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	4	4	4	4
	-	-	1	1	1	1	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	4	4	4	4
	-	-	1	1	1	1	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	4	4	4	4
	-	-	1	1	1	1	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	4	4	4	4
	-	-	1	1	1	1	1	1	1	1	1	1	8	8	8	8	4	4	4	4	1	1	1	1	10	10	10	10
	-	-	1	1	1	1	1	1	1	1	1	1	8	8	8	8	6	6	6	6	4	4	4	4	10	10	10	10
	-	-	1	1	1	1	1	1	1	1	1	1	8	8	8	8	6	6	6	6	4	4	4	4	10	10	10	10

AFTERNOON	12				1				2				3				4				5				6			
	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45
	12	12	12	12	12	12	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	4	4	4	4
	12	12	12	12	12	12	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	4	4	4	4
	12	12	1	1	1	1	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	4	4	4	4
	3	3	3	3	3	3	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	4	4	4	4
	6	6	6	6	6	6	1	1	1	1	1	1	8	8	8	8	4	4	4	4	1	1	1	1	10	10	10	10
	4	4	4	4	4	4	1	1	1	1	1	1	8	8	8	8	6	6	6	6	4	4	4	4	10	10	10	10
	8	8	8	8	6	6	1	1	1	1	1	1	8	8	8	8	6	6	6	6	4	4	4	4	10	10	10	10

EVENING&NIGHT	7				8				9				10				11				12				1				2			
	00	15	30	45	00	15	30		00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45	00	15	30	45
	4	4	4	4	3	3	3		6	6	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	-	-	-	-
	4	4	4	4	3	3	3		6	6	1	1	1	1	1	1	10	10	10	10	6	6	6	6	3	3	3	3	-	-	-	-
	3	3	1	1	12	12	12		1	1	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	-	-	-	-
	3	3	1	1	12	12	12		1	1	1	1	1	1	1	1	4	4	4	4	10	10	10	10	8	8	8	8	-	-	-	-
	10	10	10	10	6	6	6		4	4	1	1	1	1	1	1	8	8	8	8	4	4	4	4	1	1	1	1	-	-	-	-
	10	10	10	0	6	6	6		4	4	1	1	1	1	1	1	8	8	8	8	4	4	4	4	1	1	1	1	-	-	-	-
	12	12	12	12	6	6	6	6	4	4	1	1	1	1	1	1	8	8	8	8	6	6	6	6	4	4	4	4	-	-	-	-

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FIG.9

FIG.9A | FIG.9B

FIG.9A

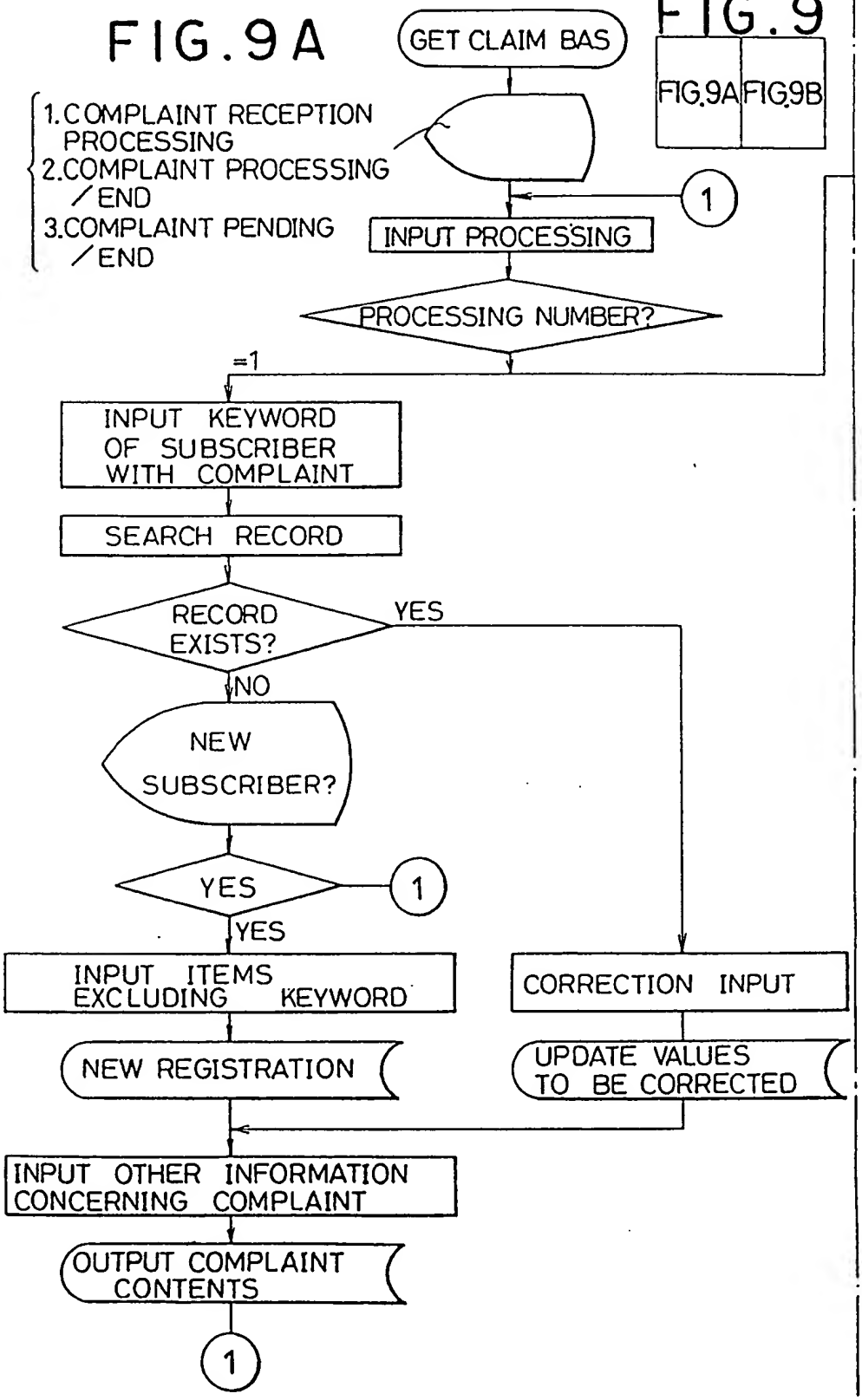

FIG.9B

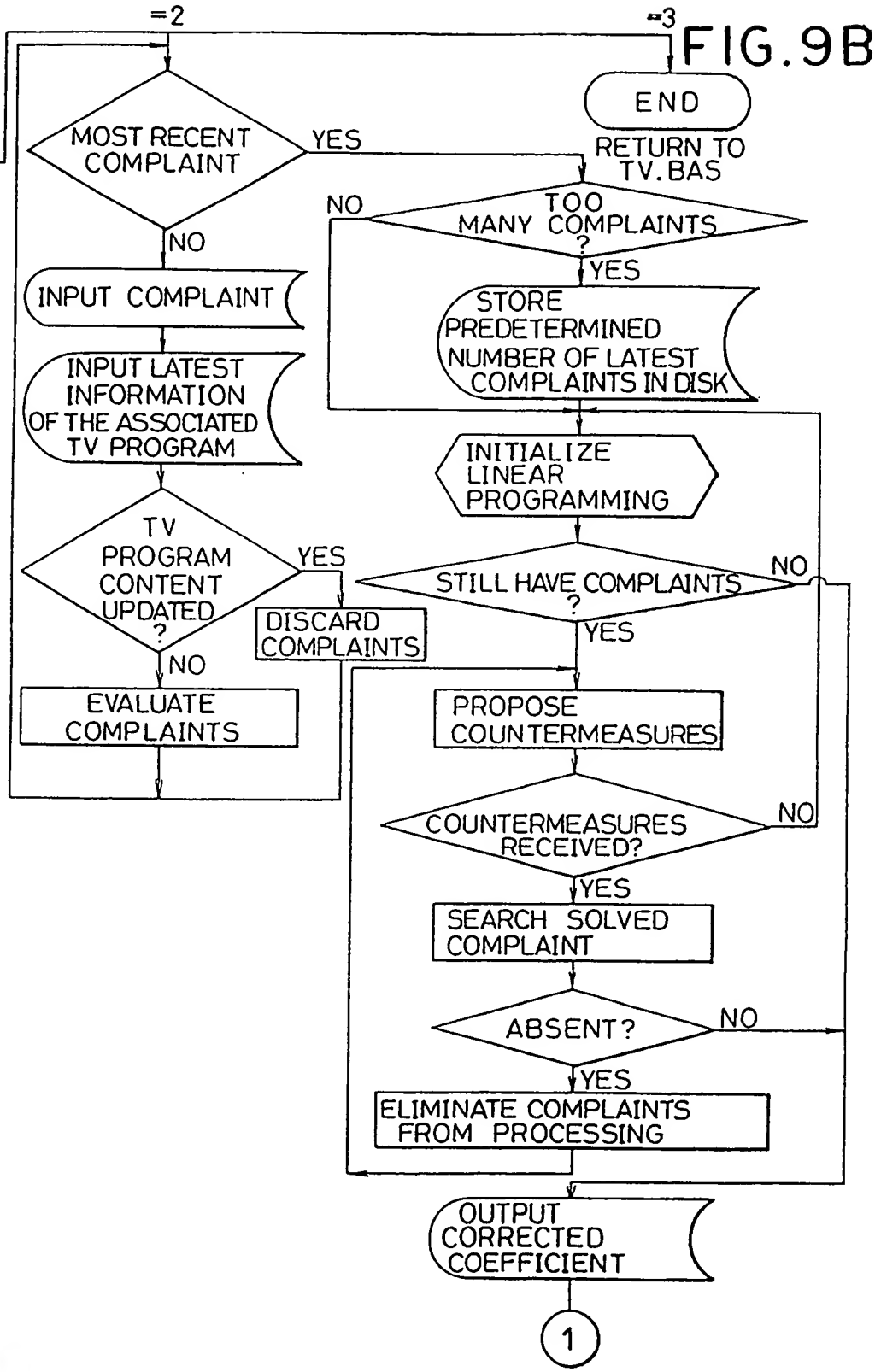
=2
=3
END
RETURN TO TV.BAS
MOST RECENT COMPLAINT
YES
NO
TOO MANY COMPLAINTS ?
NO
YES
INPUT COMPLAINT
STORE PREDETERMINED NUMBER OF LATEST COMPLAINTS IN DISK
INPUT LATEST INFORMATION OF THE ASSOCIATED TV PROGRAM
INITIALIZE LINEAR PROGRAMMING
TV PROGRAM CONTENT UPDATED ?
YES
NO
STILL HAVE COMPLAINTS ?
NO
YES
DISCARD COMPLAINTS
EVALUATE COMPLAINTS
PROPOSE COUNTERMEASURES
COUNTERMEASURES RECEIVED?
NO
YES
SEARCH SOLVED COMPLAINT
ABSENT?
NO
YES
ELIMINATE COMPLAINTS FROM PROCESSING
OUTPUT CORRECTED COEFFICIENT
1

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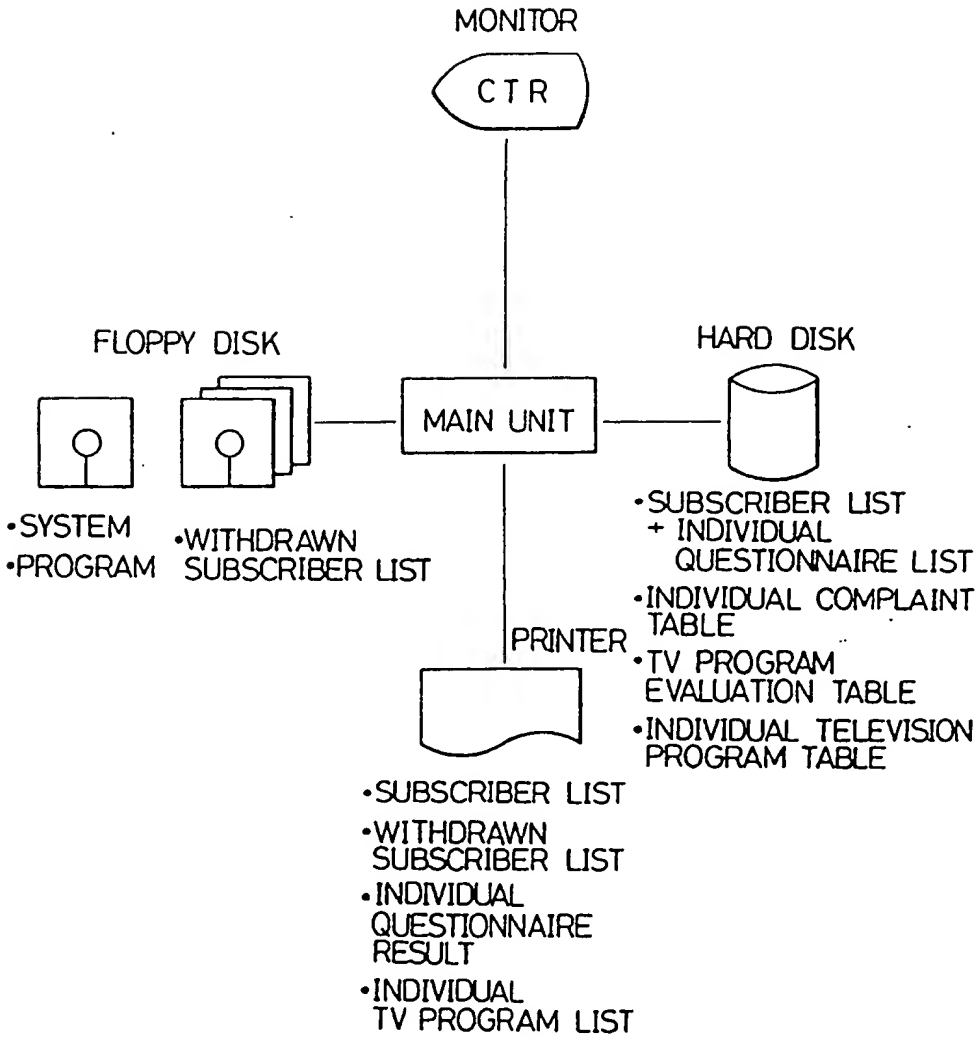
FIG. 10



SPECIFICATION

Method of editing individual television programs and apparatus therefore

The present invention relates to editing of an individual television program according to linear programming, a method of automatically controlling a program rating, and an apparatus therefor.

In order to implement such an apparatus according to conventional techniques, a program editor selects suitable programs reflecting a customer's taste from among all available television programs by utilizing subjective knowledge according to the results of questionnaires filled by end users (customers). In this case, the programs are selected on an at least a once-per-week basis. The programs are listed and printed out in a tape-like table (to be referred to as a table hereinafter) according to the channel numbers and time intervals. The TV or VTR is then automatically set according to this table. Japanese Patent Publication Nos. 41–8542, 42–1882, 53–40340, and 59–21114 issued to the present applicant are concerned with the above conventional system.

It is an object of the present invention to edit an individual television program list which is formed on the basis of objective decision and which satisfies a customer.

It is another object of the present invention to provide a method and apparatus for editing individual television program lists in a short period of time, even if many customers simultaneously order the lists.

It is still another object of the present invention to eliminate subjective opinions of an editor when he selects programs suitable for the tastes of customers from among all available television programs.

It is still another object of the present invention to provide a method employing linear programming for questionnaires and program evaluation and adopting a technique for feeding back complaints against the evaluation results, thereby improving satisfaction of the customers in the individual television programs listed by the editor.

It is still another object of the present invention to edit a control tape for controlling an automatic controller incorporated in a TV or VTR according to the program list.

In order to achieve the above objects of the present invention, the present invention is constituted by a method comprising the steps of: statistically processing objective data according to linear programming; inputting processed results in a computer, storing them on a hard disk, and printing out the contents therein; and periodically feeding back complaints to be compared against the processing results to improve reliability of the data. The preferred embodiment also includes editing of a control tape. The functional system diagram is shown in Fig. 2.

Embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a conventional system;

Figure 2 is a block diagram of a system according to the present invention;

Figure 3 is a diagram showing a computer program according to the present invention;

Figure 4 is a table showing the relationship between time intervals, days, and television channel numbers according to the results of questionnaires;

Figure 5 is a flow chart for processing questionnaire information (subscriber data registration);

Figure 6 is a flow chart of television program evaluations;

Figure 7 is a flow chart for editing television programs according to linear programming;

Figure 8 is a table showing an output of a television program table;

Figure 9 is a flow chart for processing a complaint;

Figure 10 is a diagram of components associated with a computer according to the present invention; and

Figures 11(a), 11(b), 11(c), and *11(d)* are all programs processed by the computer.

The present invention is constituted by a means for evaluating questionnaires collected from end users, a means for evaluating all available television programs, a means for calculating the evaluation results according to linear programming and editing data (a television program list for time intervals and channel numbers in a form suitable for each customer), a means for inputting the data in a computer and causing the computer to calculate the data, a means for temporarily storing an output from the computer, a means for printing out each individual television program list (to be referred to as a program list hereinafter) according to the storage contents, a means for feeding back complains against the first printed-out program list, and a means for automatically controlling a TV or VTR according to the program list. The constitution of the present invention described above is expressed as a program diagram in Fig. 3.

Although hardware associated with the above operations is added to constitute the entire system, a control tape is finally edited to control an automatic controller incorporated in a TV or VTR. This is known in conventional systems to those skilled in the art, and since it is not directly associated with the present invention, a detailed description thereof will be omitted. The structures the operations of the means described above will be described below:

(1) Subscriber Questionnaire Result Input Means

Fig. 4 shows one form of questionnaire used as a questionnaire result input means for extracting and representing individual tastes. Referring to Fig. 1, the leftmost column represents days of the week, and the uppermost row represents time intervals (in units of 15 minutes). Television channel Nos. are respectively filled at intersections of corresponding rows and columns. A basic questionnaire for editing the list described above is exemplified below:

--Subscriber Questionnaire--

Q1: Are you married or single?
1. Single
2. Married without children
3. Married with children in the age group of 0 to 6 years old
4. Married with children in the age group of 7 to 12 years old
5. Married with children in the age group of 13 years old or more

Q2: What is your age group?
6. 25 years old or less
7. 35 years old or less
8. 45 years old or less
9. 55 years old or less
10. 56 years old or more

Q3: Do you watch NHK (Nihon Hoso Kyokai) programs?
11. Never
12. Only news or morning programs
13. Only educational programs
14. The same amount as commercial television programs
15. Usually

Q4: Do you watch political and economic programs?
16. Always
17. Usually
18. Often
19. Sometimes
20. Never

Q5: Do you watch science programs?
21. Always
22. Usually
23. Often
24. Sometimes
25. Never

Q6: Do you watch historical programs?
26. Always
27. Usually
28. Often
29. Sometimes
30. Never

Q7: Do you watch documentary programs?
31. Always
32. Usually
33. Often
34. Sometimes
35. Never

Q8: Do you watch news programs?
36. Always
37. At least once a day
38. Not if a desired program is in the same time interval
39. Sometimes
40. Never

Q9: Do you like performing arts programs?
41. Like very much
42. Like somewhat
43. Indifferent
44. Dislike somewhat
45. Dislike very much

Q10: Do you like sports programs?
46. Like very much
47. Like somewhat
48. Indifferent
49. Dislike somewhat
50. Dislike very much

Q11: Do you like "variety talk show" programs?
51. Like very much
52. Like somewhat
53. Indifferent
54. Dislike somewhat
55. Dislike very much

Q12: Do you like quiz show programs?
56. Like very much
57. Like somewhat
58. Indifferent
59. Dislike somewhat
60. Dislike very much

Q13: Do you like variety show programs?
61. Like very much
62. Like somewhat
63. Indifferent
64. Dislike somewhat
65. Dislike very much

Q14: Do you like "rock'n' roll" and "foreign pops" musical programs?
66. Like very much
67. Like somewhat
68. Indifferent
69. Dislike somewhat
70. Dislike very much

Q15: Do you like "folk song" and "contemporary singer/song writers or equivalent" musical programs?
71. Like very much
72. Like somewhat
73. Indifferent
74. Dislike somewhat
75. Dislike very much

Q16: Do you like "classical" musical programs?
76. Like very much
77. Like somewhat
78. Indifferent
79. Dislike somewhat
80. Dislike very much

Q17: Do you like *Samurai* programs?
81. Like very much
82. Like somewhat
83. Indifferent
84. Dislike somewhat
85. Dislike very much

Q18: Do you like "home drama" and comedy programs?

86. Like very much
87. Like somewhat
88. Indifferent
89. Dislike somewhat
90. Dislike very much

Q19: Do you like suspense and action dramas?
91. Like very much
92. Like somewhat
93. Indifferent
94. Dislike somewhat
95. Dislike very much

Q20: Do you like foreign movies in Japan?
96. Like very much
97. Like somewhat
98. Indifferent
99. Dislike somewhat
100. Dislike very much

In the above questionnaire, five selection items are provided for each of 20 questions, so that a total of 20×5=100 items are provided. The 20 questions include questions on family members, age groups, time intervals in which customers do not watch television, and favorite dramas, as well as questions for determining whether the customers prefer NHK programs and news programs, and which program is the most interesting. Each question has five possible selection items. The items for linear programming (to be described later) are assigned with numbers as follows. The first question is assigned with P(1) to P(5); the second question with P(6) to P(10); the third question with P(11) to P(15); . . .; and the twentieth question with P(96) to P(100). The flow chart of the subscriber data registration/retrieval (correction) is shown in Fig. 5.

(2) TV Program Evaluation Means

A TV program evaluation means has the same form as that of the questionnaire described in (1) Subscriber Questionnaire Result Input Means, and is associated with the contents of questions asked of the subscribers for respective TV programs.

--TV Program Evaluation--

E1: Target age group of the TV program
1. Children of 6 years old or less
2. Children of 7 to 12 years old
3. Young people
4. Middle-aged people
5. The Elderly

E2: Political and economic factor
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E3: Scientific factor
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E4: Historical and educational factor
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E5: Documentary factor

1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E6: Factory of news or other information source
1. Strong
2. Moderate
3. Slight.
4. Very slight
5. None

E7: Factor of show business and gossip
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E8: Factor of sports program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E9: Factor of variety talk show
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E10: Factor of quiz show program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E11: Factor of variety show
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E12: Factor of rock'n' roll and pops program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E13: Factor of Japanese pops program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E14: Factor of classical music program
1. Strong
2. Moderate

3. Slight
4. Very slight
5. None

E15: Factor of *Samurai* program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None.

E16: Factor of home drama and comedy program
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E17: Factor of suspense and action drama
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

E18: Factor of foreign movie in Japan
1. Strong
2. Moderate
3. Slight
4. Very slight
5. None

The data registration for TV programs is given in the flow chart of Fig. 6.

(3) Linear Programming Means

The basic algorithm for linear-programming the evaluations in the above (1) and (2) will be described. The system of the present invention is based on the following algorithm:

$$PI(i) = \sum_{j=1}^{n} Pc(j) \cdot P(j) \cdot T(i,j) \qquad (1)$$

where

PI(i): the degree of interest of one subscriber for the ith program (the degree is represented by a numeral; the degree given by numeral "0" represents no interest).

i: the ith program when the 21 hours from 5 a.m. to 2 a.m. are divided into 15-minute intervals.

P(j): representing that the subscriber circles the jth items in the questionnaire. If the subscriber circles item 3 in question 3, $P(11)=P(12)=P(14)=P(15)=0$ and $P(13)=1$.

n: 20 questions×5 selection items = 100

T(i,j): representing that the jth item of the Ith TV program is circled, *i* and *j* are given by 1 or 0.

Pc(j): an unknown coefficient for $0 \leqq Pc(j)$ (having nothing to do with the subscribers)

Equation (1) is a mathematical expression for evaluating a degree of commonness between the subscriber preferences and the TV programs. Coefficient Pc(j) is commonly given for all subscribers. The value of Pc(j) is accurately determined by the feedback of complaints from the subscribers.

In order to evaluate commonness between the subscriber preferences and the TV programs, linear programming is represented by an equation of the first degree. The coefficient Pc(j) is a common value for all subscribers. The value of Pc(j) is accurately calculated by feeding back (i.e., learning) complaints from the subscribers, and a detail description thereof will be made later.

(4) Data Storage Means and Printout Means

A data storage means according to the present invention is exemplified by a hard disk. Data input to the hard disk is immediately printed out, as shown in the flow chart of Fig. 7. If data for several thousands of subscribers is stored in the hard disk and code numbers are respec-

tively assigned to the individual subscribers, an optical program table for each subscriber can be printed out, as shown in Fig. 8. According to a test, it took about 20 minutes to print out each program table after evaluation of the questionnaire if program language FORTRAN was used. The term "print out" does not mean that the program table is finally presented to the corresponding subscriber but that the table is confirmed in processing. The printed program table must be tested. By collecting complaints and feeding them back, a more complete program table can be prepared.

(5) Complaint Processing

As described last in the basic algorithm for the above data processing, the value of Pc(j) is accurately calculated by collecting complaints from the subscribers. An example of complaint reception is given as follows:

Calculation results are given for a given subscriber:

PI(Tue/19:30)TBS=4.9 (the degree of interest)

PI(Tue/19:30)NHK=4.8 (the degree of interest)

where TBS and NHK are Japanese TV broadcasting stations. A proposal for programming station TBS for Tuesday 19:30 is made. Assume that the given subscriber presents a complaint to this proposal in the following manner.

"PI(j1)≧PI(i2)" is not acceptable and

"PI(i1)<PI(i2)" is desired

In this case, a difference between the degree of interest for PI(i2) and that for PI(i1) is represented by Yi. In other words, this is associated with an evaluation of the degree of importance of the complaint. At present, Yi= −1. In this case,

$$PI(i2)-\{PI(i1)+Yi\}\leqq 0$$

Substitution of equation (1) into the above inequality yields the following inequality:

$$\sum_{j=1}^{n} Pc(j) \cdot P(j) \cdot \{T(i1,j)-T(i2,j)\}-Yi\leqq 0$$

Assuming that

$$P(j) \cdot \{T(i1,j)-T(i2,j)\}=Aij \text{ and}$$

$$Pc(j)=Xj$$

the above inequality can be rewritten as:

$$\sum_{j=1}^{n} Aij \cdot Xj-Yi\leqq 0$$

The right-hand side is then substituted by Vi, so that:

$$Vi=\sum_{j=1}^{n} Aij \cdot Xj-Yi$$

Xj is determined to minimize Vi. Assuming only a sum V of positive values Vi (programs causing complaints),

$$V=\sum_{k}^{m} Vi \quad \text{for } Vi>0$$

where m is the total number of Vi components for Vi>0, as many as complaints possible must be received. A minimum V is then calculated to determine the accurate Xj. The above operation

is given by the flow chart in Fig. 9.

Referring to Fig. 9, "Search Record" in Processing=1 means search of data for one subscriber. "Input Items Excluding Keyword" indicates the selection items excluding the subscriber name read in *katakana* characters and the date of birth. "New Input" indicates a new subscriber to be registered. However, if the corresponding record is found, i.e., YES, the correct input is entered to update the corresponding value. The flow then advances by selecting an alternative step. In short, in complaint processing, a series of steps from "Initialize Linear Programming" to "Find Countermeasures" are important in Processing=2. More specifically, linear programming initialization is a recalculation of Pc(j). The countermeasures indicate that a Pc(j) value different from the current value is calculated and updates the current value. These mathematical steps are the center of complaint processing, i.e., the learning function. The coefficient Pc(j) can be more accurate to improve prediction precision. Therefore, more suitable programs can be provided to the subscribers.

The steps in the program can be represented by Figs. 11(a), 11(b), 11(c), and 11(d). Since this program is used under copyright, many commands are added thereto.

The embodiment described above exemplifiers TV program ratings. However, the method and apparatus of the present invention is not limited to such a particular application. Evaluations can be made according to questionnaires similar to that in the above embodiment. The results are linear-programmed to collect the individual complaints and then to feed them back for processing, thereby further improving prediction precision. In this manner, the present invention can also be applied to surveys other than the embodiment described in this specification.

CLAIMS

1. Apparatus for editing an individual television program table so as to print out a list in units of time intervals and channel numbers in a form optimal for each of a number of subscribers by selecting optimal programs from among a plurality of television programs, comprising:
subscriber taste evaluating means for evaluating questionnaires showing subscriber taste in TV programs;
televison programs evaluating means;
processing means for processing results from said subscriber taste and television program evaluating means;
storing means for storing processed results;
printing means for printing out results in said storage means in the form of an individual subscriber program list; and
feedback means for receiving a complaint from a subscriber when the subscriber makes a complaint about the printed program list, and for feeding back the complaint to increase a prediction reliability of a subsequent program list.

2. Apparatus as claimed in claim 1, wherein the feedback means performes a looped operation whose gain is always not less than 1.

3. Apparatus as claimed in claim 1, including a reader unit for reading the printed individual subscriber program list and means for automatically setting a television set or video tape recorder in accordance with output from the reader unit.

4. Apparatus as claimed in claim 3, comprising means for automatically controlling a program rating for a television set or a video tape recorder in accordance with output from the reader unit.

5. A method of editing an individual television program table to as to print out a list in units of time intervals and channel numbers in a form optimal for each of a number of subscribers by selecting optimal programs from among a plurality of television programs, comprising:
performing subscriber taste evaluation by evaluating questionnaires showing subscriber taste in TV programs;
evaluating television programs by content;
processing results of the said subscriber taste and television program evaluation means;
storing the processed results;
printing out the stored results in the form of an individual subscriber program list; and
receiving complaints from subscribers concerning the printed program list, and feeding back the complaints to increase a prediction reliability of a subsequent program list.

6. A method as claimed in claim 5, wherein the feeding back of complaints includes a looped operation whose gain is always not less than 1.

7. A method as claimed in claim 5, comprising automated scanning of the printed individual subscriber program list and automatic setting of a television set or video tape recorder.

8. A method as claimed in claim 5, comprising editing the printed individual subscriber program list to automatically control a program rating of a television set or a video tape recorder while the list is read by a reader unit.

9. Apparatus for editing an individual television program table, substantially as hereinbefore described with reference to and as illustrated in Figs. 2 to 11 of the accompanying drawings.

10. A method of editing an individual television program table, substantially as hereinbefore described with reference to and as illustrated in Figs. 2 to 11 of the accompanying drawings.

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